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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,841	06/22/2006	Kazunori Yamamoto	06421/LH	6328

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EXAMINER	
LEGESSE, HENOK D	
ART UNIT	**PAPER NUMBER**
2861	

MAIL DATE	DELIVERY MODE
07/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,841	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	Henok Legesse	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 09/01/2006 and 06/22/2006.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1,3,4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hotomi (US 5,477,249) in view of Anderson et al (US 6,017,112).

Regarding claim 1, Hotomi teaches a liquid ejection apparatus (an image forming apparatus, fig.1) comprising:

a liquid ejection head (1, fig.1) having a nozzle (15) to eject droplets ("Id", fig.3) of charged solution (6, fig.1) onto a substrate (16) (col.4, lines 55-66);

an ejection voltage supply (20 which constitute elements 9,17,18, and 19) to apply an ejection voltage to a solution (6) inside the nozzle (15) (col.4, lines 1-13);

a convex meniscus generator (14 which constitute elements 9,10,11, and 12) to form a state in which the solution (6) inside the nozzle (15) rises from the nozzle in a convex shape (forms meniscus "Im" in fig.2) (col.3, lines 46-58, col.4, lines 24-29); and

an operation controller (13, fig.1) to control application of a drive voltage to drive the convex meniscus generator (14) and application of an ejection voltage by the ejection voltage supply (20) so that the drive voltage to the convex meniscus generator (14) is applied in timing overlapped with the application of a pulse voltage as the ejection voltage by the ejection voltage supply (20) ("both vibrational and electrostatic energy are required to be applied at the same time for the ink to jet" , see col.4, lines 47-55).

Hotomi fails to teach a nozzle with an inner diameter of 15μm or less.

However, from the same endeavor Anderson et al teaches a nozzle with an inner diameter of 15μm or less (col.3, lines 16-26).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the diameter of the nozzles of Hotomi to be of 15μm or less as taught by Anderson et al in order to able the liquid ejecting head jet smaller ink droplets thereby improving the quality of the image formed.

Regarding claim 3, Hotomi further teaches the operation controller (13, fig.1) applies the drive voltage to the convex meniscus generator (14) in advance, and also in

timing overlapped with the application of the ejection voltage by the ejection voltage supply (20) (col.4, lines 38-55).

Regarding claims 4 and 7, Hotomi further teaches a liquid ejection head includes a plurality of nozzles each of which has the convex meniscus generator (see fig.14-16, and fig.18-19 shows the sectional views and parts of multi-nozzle head).

4. Claims 2,5,6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hotomi as modified by Anderson et al further in view of Morikoshi et al (US 6,382,754).

Regarding claim 2, Hotomi as modified by Anderson et al teaches substantially the claimed invention except the operation controller applies a voltage with reversed polarity to the ejection voltage just before or just after the ejection voltage is applied to the solution inside the nozzle.

However, from the same endeavor Morikoshi et al teaches application of a voltage (fig.5 (e) and fig.6) with reversed polarity to the ejection voltage just before or just after the ejection voltage is applied to the solution inside the nozzle (fig.5 (e) and fig.6) in order to effectively attenuate the kinetic energy of the meniscus and to hold the meniscus at apposition suitable for jetting out the next droplet to provide a stable print output (abstract, fig.5, and fig.6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have applied a voltage with reversed polarity to the ejection voltage just before or just after the ejection voltage is applied to the solution inside the nozzle of Hotomi as modified by Anderson et al based on the teaching of Morikoshi et al. The motivation being to effectively attenuate the kinetic energy of the meniscus and to hold the meniscus at apposition suitable for jetting out the next droplet to provide a stable print output (abstract of Morikoshi et al).

Regarding claim 5, Hotomi further teaches the operation controller (13, fig.1) applies the drive voltage to the convex meniscus generator (14) in advance, and also in timing overlapped with the application of the ejection voltage by the ejection voltage supply (20) (col.4, lines 38-55).

Regarding claims 6 and 8, Hotomi further teaches a liquid ejection head includes a plurality of nozzles each of which has the convex meniscus generator (see fig.14-16, and fig.18-19 shows the sectional views and parts of multi-nozzle head).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henok Legesse whose telephone number is (571) 270-1615. The examiner can normally be reached on Mon - FRI, 7:30-5:00, ALT.FRI EST.TIME.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*** H.L.
07/05/2007

MATTHEW LUU
SUPERVISORY PATENT EXAMINER